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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/914,062	08/22/2001	Hubertus Wilhelmus Albertus Dries		8567

7590 02/13/2004

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EXAMINER	
MCHENRY, KEVIN L	

ART UNIT	PAPER NUMBER
1725	

DATE MAILED: 02/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/914,062	DRIES ET AL.	
	Examiner	Art Unit	
	Kevin L McHenry	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-13 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-13 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 August 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Specification

1. The disclosure is objected to because of the following informalities:

Page 14, line 4, "conduit (9)" should be "conduit (109)".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-6 and 8-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Child (U.S.P. 4,997,800) in view of Parker et al. (U.S.P. 4,692,311).

Child teaches an fluidized catalytic cracking (FCC) apparatus that includes a vertical primary cyclone vessel and a secondary cyclone connected to the primary cyclone. The primary cyclone is closed at its upper end by a cover with an opening that is connected to a gas outlet conduit. The gas outlet conduit has a gas inlet opening that is located at the same vertical level as the opening in the cover. The bottom of the primary cyclone is shaped into a frusto-conical section that ends in a dipleg (see U.S.P. 4,997,800; particularly Figure3; column 1, lines 13-23; column 9, lines 29-40; column 10, lines 28-60).

Child does not teach that the cyclone vessels have tubular housing with tangential inlets, a stripping zone with a vortex stabilizer, or a riser.

Parker et al. teach an FCC apparatus that includes a primary cyclone and a secondary cyclone that is connected to the primary cyclone. A riser is connected to the inlet of the primary cyclone. The cyclones have tubular shapes with tangential inlets. The primary cyclone includes a stripping zone with a means to supply a stripping medium. A vortex stabilizer is provided at the interface between the primary cyclone and the stripping zone. Parker et al. teach that using a vortex stabilizer allows stripping gas to be added to the cyclone separation zone without substantial loss of efficiency and that the combination of the cyclone and stripper allow quick stripping and longer stripping time for desorbing hydrocarbon products from catalysts (see U.S.P. 4,692,311; particularly Figures 1 and 2; column 2, lines 25-34).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the apparatus of Child by the teachings of Parker et al. One would have been motivated to do so in order to allow stripping gas to be added to the cyclone separation zone without substantial loss of efficiency, to allow quick stripping, and to provide longer stripping times to desorb hydrocarbon products from catalysts, as taught by Parker et al.

Regarding claims 2 and 13, the references noted disclose all of the claim limitations as set forth above, but the references do not explicitly teach the ratio of the inlets distances to the cyclone housing diameter, nor do they explicitly teach the solids content of the mixture entering the primary cyclone. The ratio of the inlet distances to the cyclone diameter and the solids content entering the primary cyclone are not considered to confer patentability to the claims. Because the reactor's cost of operation and its efficiency of operation are variables that can be modified, among others, by

designing the size of the primary cyclone to affect its operating efficiency (since different sizes effect different sizes of particles to varying degrees) and its cost. The solids content can also be modified to affect operating efficiency and cost since higher solids content will require longer processing times and/or more secondary cyclones to remove the required amount of solids.

The precise ratio of lengths or solids content would have been considered a result effective variable by one having ordinary skill in the art at the time that the invention was made. As such, without showing unexpected results, the claimed ratio and solids content cannot be considered critical. Accordingly, one of ordinary skill in the art at the time that the invention was made would have optimized, by routine experimentation, the ratio of the distance between inlets to the diameter of the cyclone and the solids content entering the primary cyclone in the references noted above to obtain the desired balance between operating cost and efficiency.

4. Claims 1-5, 7, and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Child (U.S.P. 4,997,800) in view of Dewitz (U.S.P. 5,869,008).

Child teaches an fluidized catalytic cracking (FCC) apparatus that includes a vertical primary cyclone vessel and a secondary cyclone connected to the primary cyclone. The primary cyclone is closed at its upper end by a cover with an opening that is connected to a gas outlet conduit. The gas outlet conduit has a gas inlet opening that is located at the same vertical level as the opening in the cover. The bottom of the primary cyclone is shaped into a frusto-conical section that ends in a dipleg (see U.S.P.

4,997,800; particularly Figure3; column 1, lines 13-23; column 9, lines 29-40; column 10, lines 28-60).

Child does not teach that the cyclone vessels have tubular housing with tangential inlets, a stripping zone with a vortex stabilizer, or a riser.

Dewitz teach an FCC apparatus that includes a primary cyclone and a secondary cyclone that is connected to the primary cyclone. The cyclones have tubular shapes with tangential inlets. The primary cyclone includes a stripping zone with a means to supply a stripping medium. A vortex stabilizer is provided at the interface between the primary cyclone and the stripping zone. The primary cyclone, secondary cyclone, and stripping zone are all located within a reactor vessel that has a larger diameter than the primary cyclone. The reactor vessel includes stripping means and means to supply a catalyst/gas mixture. Dewitz teaches that this design allows the cyclone to be smaller because it does not need its own fluidized bed (see U.S.P. 5,869,008; particularly Figure 1; column 1, lines 61-65; column 4, lines 8-57; column 5, lines 2-4, 46-50; column 8, lines 19-22).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the apparatus of Child by the teachings of Dewitz. One would have been motivated to do so in order to provide a cyclone that is smaller and that does not need its own fluidized bed, as taught by Dewitz.

Regarding claims 2 and 13, the references noted disclose all of the claim limitations as set forth above, but the references do not explicitly teach the ratio of the inlets distances to the cyclone housing diameter, nor do they explicitly teach the solids content of the mixture entering the primary cyclone. The ratio of the inlet distances to the cyclone diameter and the solids content entering the primary cyclone are not

considered to confer patentability to the claims. Because the reactor's cost of operation and its efficiency of operation are variables that can be modified, among others, by designing the size of the primary cyclone to affect its operating efficiency (since different sizes effect different sizes of particles to varying degrees) and its cost. The solids content can also be modified to affect operating efficiency and cost since higher solids content will require longer processing times and/or more secondary cyclones to remove the required amount of solids.

The precise ratio of lengths or solids content would have been considered a result effective variable by one having ordinary skill in the art at the time that the invention was made. As such, without showing unexpected results, the claimed ratio and solids content cannot be considered critical. Accordingly, one of ordinary skill in the art at the time that the invention was made would have optimized, by routine experimentation, the ratio of the distance between inlets to the diameter of the cyclone and the solids content entering the primary cyclone in the references noted above to obtain the desired balance between operating cost and efficiency.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Haddad et al. (U.S.P. 5,055,177), Helstrom et al. (U.S.P. 5,279,727), Kruse (U.S.P. 5,112,576), Dries et al. (U.S.P. 4,313,910), Dries (U.S.P. 5,938,803), MacLean et al. (U.S.P. 4,380,105), Buyan et al. (U.S.P. 4,714,541), and Lee (U.S.P. 4,678,642) are cited of interest for illustrating cyclone separator design

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin L McHenry whose telephone number is (571) 272-1181. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin McHenry

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2/7/04